

We claim:

1. A method of making a thermally-removable adhesive, comprising the steps of:

mixing a bismaleimide compound and a monomeric furan compound, said monomeric furan compound containing an oxirane group, at an elevated temperature of greater than approximately 90°C to form a homogeneous solution;

mixing a curative at said elevated temperature to form a second homogeneous mixture; and

cooling said second homogeneous mixture to a temperature less than approximately 70°C to simultaneously initiate a Diels-Alder reaction between said furan and said bismaleimide and a epoxy curing reaction between said curative and said oxirane group, thereby forming a thermally-removable adhesive.

2. The method of claim 1 wherein the curative is selected from the group consisting of amine curatives, anhydrides, carboxylic acids, and alcohols.
3. The method of claim 1 wherein the curative is selected from the group consisting of chlorendic, dodecenylsuccinic anhydride, nadic methyl anhydride, pyromellitic dianhydride, maleic anhydride, 3-3'-dimethylmethylenedi(cyclohexylamine), polyoxypropylenediamine, and nonylphenol.
4. The method of claim 1 wherein the monomeric furan is furfuryl glycidyl ether.

5. The method of claim 1 wherein the bismaleimide compound is selected from 1,1'-(methylenedi-4,1-phenylene)-bismaleimide, N,N'-(4-methyl-1,3-phenylene)-bismaleimide, N,N'-m-phenylene-bismaleimide, and $((C_4H_2O_2N)C_6H_4)_2(OSi(CH_3)_2)_4O$.
6. The method of claim 1 wherein the second homogeneous mixture is formed within less than approximately 20 minutes.
7. The method of claim 1 wherein heating said thermally-removable adhesive to a temperature greater than approximately 100°C initiates melting of the adhesive.
8. A method of adhering two pieces together, comprising:
 - mixing a bismaleimide compound and a monomeric furan compound, said monomeric furan compound containing an oxirane group, at an elevated temperature of greater than approximately 90°C to form a homogeneous solution;
 - mixing a curative at said elevated temperature to form a second homogeneous mixture;
 - cooling said second homogeneous mixture to a temperature less than approximately 70°C to form a thermally-removable adhesive;
 - contacting said thermally-removable adhesive to the surface of a first piece;
 - heating to a temperature greater than approximately 90°C;
 - contacting the surface of a second piece to the thermally-removable adhesive to form a two-piece system; and

curing said two-piece system by cooling to less than approximately 70°C to adhere the first piece to the second piece.

9. The method of claim 8 wherein said first piece is separated from said second piece by heating to a temperature greater than approximately 100°C.
10. The method of claim 8 wherein the step of heating to a temperature greater than approximately 90°C is performed after the surface of the first piece and the surface of the second piece have been contacted to the thermally-removable adhesive.
11. The method of claim 8 wherein the bismaleimide compound is selected from 1,1'-(methylenedi-4,1-phenylene)-bismaleimide, N,N'-(4-methyl-1,3-phenylene)-bismaleimide, N,N'-m-phenylene-bismaleimide, and $((C_4H_2O_2N)C_6H_4)_2(OSi(CH_3)_2)_4O$.
12. The method of claim 8 wherein the curative is selected from the group consisting of amine curatives, anhydrides, carboxylic acids, and alcohols.
13. The method of claim 8 wherein the curative is selected from the group consisting of chlorendic, dodecenylsuccinic anhydride, nadic methyl anhydride, pyromellitic dianhydride, maleic anhydride, 3-3'-dimethylmethylenedi(cyclohexylamine), polyoxypropylenediamine, and nonylphenol.
14. A method to form a conformal coating solution, comprising comprising the steps of:

mixing a bismaleimide compound and a monomeric furan compound, said monomeric furan compound containing an oxirane group, at an elevated temperature of greater than approximately 90°C to form a homogeneous

solution;

mixing a curative at said elevated temperature to form a second homogeneous mixture;

diluting said homogeneous mixture with a solvent; and

applying said diluted homogeneous mixture to a surface at a temperature less than approximately 70°C to simultaneously cure and evaporate at least a portion of said solvent to form a thermally-removable conformal coating.

15. The method of claim 14 wherein said solvent is a polar solvent.
16. The method of claim 14 wherein the bismaleimide compound is selected from 1,1'-(methylenedi-4,1-phenylene)-bismaleimide, N,N'-(4-methyl-1,3-phenylene)-bismaleimide, N,N'-m-phenylene-bismaleimide, and $((C_4H_2O_2N)C_6H_4)_2(OSi(CH_3)_2)_4O$.
17. The method of claim 14 wherein the curative is selected from the group consisting of amine curatives, anhydrides, carboxylic acids, and alcohols.
18. The method of claim 14 wherein the curative is selected from the group consisting of chlorendic, dodecenylsuccinic anhydride, nadic methyl anhydride, pyromellitic dianhydride, maleic anhydride, 3-3'-dimethylmethylenedi(cyclohexylamine), polyoxypropylenediamine, and nonylphenol.
19. The method of claim 14 wherein the surface is a surface of a printed wire board.